

REMARKS/ARGUMENTS

In the Office Action of June 10, 2010, claims 1-10 were rejected. Additionally, it appeared that the specification was objected to. However, Applicants hereby request reconsideration of the application in view of the below-provided remarks.

Objection to the Specification

As described above, it appeared that the specification was objected to. Specifically, the Office Action seems to suggest that section headings be added to the specification, according to the guidelines set forth in 37 C.F.R. § 1.77(b). Applicants note that the suggested section headings are not mandatory, and in fact when Rule 77 was amended in 1996 (61 FR 42790, Aug. 19, 1996), Bruce A. Lehman, Assistant Secretary of Commerce and Commissioner of Patents and Trademarks, stated in the Official Gazette:

“Section 1.77 is permissive rather than mandatory. ... 1.77 merely expresses the Office's preference for the arrangement of the application elements. The Office may advise an applicant that the application does not comply with the format set forth in 1.77, and suggest this format for the applicant's consideration; however, the Office will not require any application to comply with the format set forth in 1.77.”

Hence, Applicants respectfully decline to amend the specification to include the indicated section headings.

Claim Rejections under 35 U.S.C. 103

Claims 1-5 were rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Wang et al. (U.S. Pat. Pub. No. 2005/0054173, hereinafter “Wang”) in view of Keys et al. (U.S. Pat. Pub. No. 2004/0235280, hereinafter “Keys”). Claim 6 was rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Wang in view of Keys, and further in view of Sultan et al. (U.S. Pat. No. 6,063,682, hereinafter “Sultan”). The Office Action on page 5 that claim 7 was rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Wang in view of Keys, and further in view of Xiang et al. (U.S. Pat.

No. 6,555,439, hereinafter “Xiang”). However, Applicants note that claim 7 was actually rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Wang in view of Keys, and further in view of Maszara et al. (U.S. Pat. No. 6,362,063, hereinafter “Maszara”). Claims 8-10 were rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Wang in view of Xiang. However, Applicants respectfully submit that the pending claims 1-10 are patentable over the cited reference.

Independent Claim 1

Applicants respectfully assert that a *prima facie* case of obviousness rejection have not been established with respect to claim 1. Specifically, Applicants respectfully assert that Wang in view of Keys does not teach all of the limitations of claim 1. In addition, Applicants respectfully assert that the Examiner has failed to provide *prima facie* support for the obviousness rejection with respect to claim 1.

Wang in view of Keys does not teach all of the limitations of claim 1.

The Office Action on page 3 suggests that Wang teaches the limitations of a) providing a semiconductor substrate, b) making a first amorphous layer in a top layer of said semiconductor substrate by a suitable implant, said first amorphous layer having a first depth, c) implanting a first dopant into said semiconductor substrate to provide said first amorphous layer with a first doping profile, d) form a second amorphous layer having a second depth that is less than said first depth and activate said first dopant, e) implanting a second dopant into said semiconductor substrate to provide said second amorphous layer with a second doping profile with a higher doping concentration than said first doping profile, and f) applying a second solid phase epitaxial regrowth action to regrow said second amorphous layer and activate said second dopant, as recited in claim 1. In addition, the Office Action further suggests that Keys teaches the limitations of c) implanting a first dopant into said semiconductor substrate to provide said first amorphous layer with a first doping profile, and d) applying a first solid phase epitaxial regrowth action to partially regrow said first amorphous layer and activate said first dopant, as recited in claim 1. The Office Action then concludes on page 4 that “[i]t would have been obvious to a person of ordinary skill in the art at the time of the

invention was made, to partially regrow the first amorphous layer, as taught by Keys, for the purpose of forming shallow junctions.”

However, Applicants respectfully assert that Wang does not teach the limitations of “*form a second amorphous layer having a second depth that is less than said first depth and activate said first dopant*” (emphasis added) and “*e) implanting a second dopant into said semiconductor substrate to provide said second amorphous layer with a second doping profile with a higher doping concentration than said first doping profile, f) applying a second solid phase epitaxial regrowth action to regrow said second amorphous layer and activate said second dopant*” (emphasis added), as recited in claim 1.

As shown in step S112 in Fig. 1, Fig. 2D and step S312 in Fig. 3, Wang teaches that a doped source/drain region (218) is formed in a substrate (200) on each side of a spacer (214). (See also paragraphs [0029], [0031], [0039], and [0041] of Wang). The Office Action suggests that the doped source/drain region (218) of Wang is equivalent to the “*second amorphous layer*” of claim 1. (See page 3 of the Office Action). However, Applicants respectfully disagree.

As described above, Wang teaches that the doped source/drain region (218) is formed in the substrate (200) on each side of the spacer (214). Wang also teaches that the doped source/drain region (218) is formed, for example, by performing an ion implantation process (216) using a gate structure (204), and spacers (205) and (214) as a mask. (See paragraphs [0029] and [0039] of Wang). However, Wang does not teach that the doped source/drain region (218) is an amorphous region. Because Wang does not teach that the doped source/drain region (218) is an amorphous region, the doped source/drain region (218) of Wang cannot be equivalent to the “*second amorphous layer*” of claim 1. Thus, Applicants respectfully assert that Wang does not teach the limitations of “*form a second amorphous layer having a second depth that is less than said first depth and activate said first dopant*” (emphasis added) and “*e) implanting a second dopant into said semiconductor substrate to provide said second amorphous layer with a second doping profile with a higher doping concentration than said first doping profile, f) applying a second solid phase epitaxial regrowth action to regrow said second*

amorphous layer and activate said second dopant” (emphasis added), as recited in claim 1.

Because Wang in view of Keys does not teach all of the limitations of claim 1, Applicants respectfully assert that claim 1 is patentable over Wang in view of Keys.

The Examiner has failed to provide *prima facie* support for the obviousness rejection with respect to claim 1.

In addition, Applicants respectfully assert that the Examiner has failed to provide *prima facie* support for the obviousness rejection with respect to claim 1.

As the MPEP makes clear, “[t]he key to supporting any rejection under 35 U.S.C. 103 is the clear articulation of the reason(s) why the claimed invention would have been obvious. The supreme Court in *KSR International Co. v. Teleflex Inc.*, 550 U.S. ___, ___, 82 USPQ2d 1385, 1396 (2007) noted that the analysis supporting a rejection under 35 U.S.C. 103 should be made explicit. The Federal Circuit has stated that ‘rejections based on obviousness cannot be sustained by mere conclusory statements; instead there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.’ *In re Kahn*, 441 F.3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006).” MPEP §2142.

However, the only statement made by the Examiner in support of an obviousness rejection of claim 1 is that “[i]t would have been obvious to a person of ordinary skill in the art at the time of the invention was made, to partially regrow the first amorphous layer, as taught by Keys, for the purpose of forming shallow junctions,” which is a mere conclusory statement and fails to clearly articulate a rationale in support of the obviousness rejection, as required by the MPEP and *KSR*. The Examiner’s identification of the teachings of Wang and Keys, along with the conclusory statement of “[i]t would have been obvious to a person of ordinary skill in the art at the time of the invention was made, to partially regrow the first amorphous layer, as taught by Keys, for the purpose of forming shallow junctions” without any rationale in support of that conclusion, does not satisfy the requirements for establishing a *prima facie* case of obviousness.

Assuming (because there is no explicit statement of the Examiner’s rationale in the Office Action) that the Examiner’s rationale is that there is some teaching,

suggestion, or motivation that would have led one of ordinary skill to combine the cited references' teachings to arrive at the claimed invention, MPEP §2143 (G) and the applicable case law require the following:

To reject a claim based on this rationale, Office personnel must resolve the *Graham* factual inquiries. Then, Office personnel must articulate the following:

- (1) a finding that there was some teaching, suggestion, or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings;
- (2) a finding that there was reasonable expectation of success; and
- (3) whatever additional findings based on the *Graham* factual inquiries may be necessary, in view of the facts of the case under consideration, to explain a conclusion of obviousness.

... If any of these findings cannot be made, then this rationale cannot be used to support a conclusion that the claim would have been obvious to one of ordinary skill in the art. (emphasis added).

If the Applicants' assumption of the Examiner's rationale as described above is correct, then Applicants are entitled to have the foregoing required items articulated. If the Examiner's rejection is based on some other rationale, Applicants are entitled to know what that rationale is and to be given an opportunity to respond. If an explanation of the Examiner's rationale is presented in the next Office Action, the next Office Action should not be made final. "The examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness. If the examiner does not produce a *prima facie* case, the applicant is under no obligation to submit evidence of nonobviousness." MPEP §2142.

In view of the foregoing, Applicants respectfully submit that the Examiner has merely provided a conclusory statement in support of the obviousness rejection and failed to clearly articulate a rational to support his conclusion, as required by the MPEP and *KSR*. Because "rejections based on obviousness cannot be sustained by mere conclusory statements," Applicants respectfully assert that the Examiner has failed to provide *prima facie* support for the obviousness rejection with respect to claim 1.

In conclusion, Applicants respectfully assert that Wang in view of Keys does not teach all of the limitations of claim 1. In addition, Applicants respectfully assert that the Examiner has failed to provide *prima facie* support for the obviousness rejection with respect to claim 1. As a result, Applicants respectfully assert that a *prima facie* case of obviousness rejection have not been established with respect to claim 1.

Dependent Claims 2-7

Claims 2-7 ultimately depend from and incorporate all of the limitations of independent claim 1. Thus, Applicants respectfully assert that claims 2-7 are allowable at least based on an allowable claim 1. Additionally, claims 6 and 7 are allowable for further reasons, as described below.

Claim 6

The Office Action on page 5 recognizes that Wang and Keys do not teach the limitation of “*said action e) is performed with at least one of B, P, As and In at an energy between 0.5 and 3 keV, and a dose of 10^{15} atoms/cm²,*” as recited in claim 6. Sultan is cited as teaching the above-identified limitation of claim 6. The Office Action then concludes that “[i]t would have been obvious to a person of ordinary skill in the art at the time of the invention was made, to perform action e) with at least one of B, P, As and In at an energy between 0.5 and 3 keV, and a dose of 10^{15} atoms/cm², as taught by Sultan, for the purpose of amorphizing the substrate.”

However, Applicants respectfully assert that the Examiner has failed to provide *prima facie* support for the obviousness rejection with respect to claim 6. As a result, Applicants respectfully assert that a *prima facie* case of obviousness rejection have not been established with respect to claim 6.

The only statement made by the Examiner in support of an obviousness rejection of claim 6 is that “[i]t would have been obvious to a person of ordinary skill in the art at the time of the invention was made, to perform action e) with at least one of B, P, As and In at an energy between 0.5 and 3 keV, and a dose of 10^{15} atoms/cm², as taught by Sultan, for the purpose of amorphizing the substrate,” which is a mere conclusory statement and fails to clearly articulate a rationale in support of the obviousness rejection, as required by the MPEP and KSR. The Examiner’s identification of the teachings of Wang, Keys, and Sultan along with the conclusory statement of “[i]t would have been obvious to a person of ordinary skill in the art at the time of the invention was made, to perform action e) with at least one of B, P, As and In at an energy between 0.5 and 3 keV, and a dose of 10^{15} atoms/cm², as taught by Sultan, for the purpose of amorphizing the substrate”

without any rationale in support of that conclusion, does not satisfy the requirements for establishing a *prima facie* case of obviousness.

Assuming (because there is no explicit statement of the Examiner's rationale in the Office Action) that the Examiner's rationale is that there is some teaching, suggestion, or motivation that would have led one of ordinary skill to combine the cited references' teachings to arrive at the claimed invention, MPEP §2143 (G) and the applicable case law require the following:

To reject a claim based on this rationale, Office personnel must resolve the *Graham* factual inquiries. Then, Office personnel must articulate the following:

- (1) a finding that there was some teaching, suggestion, or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings;
- (2) a finding that there was reasonable expectation of success; and
- (3) whatever additional findings based on the *Graham* factual inquiries may be necessary, in view of the facts of the case under consideration, to explain a conclusion of obviousness.

... If any of these findings cannot be made, then this rationale cannot be used to support a conclusion that the claim would have been obvious to one of ordinary skill in the art. (emphasis added).

If the Applicants' assumption of the Examiner's rationale as described above is correct, then Applicants are entitled to have the foregoing required items articulated. If the Examiner's rejection is based on some other rationale, Applicants are entitled to know what that rationale is and to be given an opportunity to respond. If an explanation of the Examiner's rationale is presented in the next Office Action, the next Office Action should not be made final.

In view of the foregoing, Applicants respectfully submit that the Examiner has merely provided a conclusory statement in support of the obviousness rejection and failed to clearly articulate a rational to support his conclusion, as required by the MPEP and *KSR*. Because "rejections based on obviousness cannot be sustained by mere conclusory statements," Applicants respectfully assert that the Examiner has failed to provide *prima facie* support for the obviousness rejection with respect to claim 6. As a result, Applicants respectfully assert that a *prima facie* case of obviousness rejection have not been established with respect to claim 6.

Claim 7

The Office Action on page 5 recognizes that Wang and Keys do not teach the limitation of “*prior to said action b), an initial dopant is implanted to provide a HALO implant area extending deeper than said first amorphous layer,*” as recited in claim 7. Maszara is used for teaching the above-identified limitation of claim 7. The Office Action then concludes that “[i]t would have been obvious to a person of ordinary skill in the art at the time of the invention was made, to provide a HALO implant area extending deeper than thefirst amorphous layer prior to making the first amorphous layer, as taught by Maszara, for the purpose of eliminating diffusion of species and confining the species at a desired distance [*sic*].”

However, Applicants respectfully assert that the Examiner has failed to provide *prima facie* support for the obviousness rejection with respect to claim 7. As a result, Applicants respectfully assert that a *prima facie* case of obviousness rejection have not been established with respect to claim 7.

The only statement made by the Examiner in support of an obviousness rejection of claim 7 is that “[i]t would have been obvious to a person of ordinary skill in the art at the time of the invention was made, to provide a HALO implant area extending deeper than thefirst amorphous layer prior to making the first amorphous layer, as taught by Maszara, for the purpose of eliminating diffusion of species and confining the species at a desired distance [*sic*],” which is a mere conclusory statement and fails to clearly articulate a rationale in support of the obviousness rejection, as required by the MPEP and *KSR*. The Examiner’s identification of the teachings of Wang, Keys, and Maszara along with the conclusory statement of “[i]t would have been obvious to a person of ordinary skill in the art at the time of the invention was made, to provide a HALO implant area extending deeper than thefirst amorphous layer prior to making the first amorphous layer, as taught by Maszara, for the purpose of eliminating diffusion of species and confining the species at a desired distance [*sic*],” without any rationale in support of that conclusion, does not satisfy the requirements for establishing a *prima facie* case of obviousness.

Assuming (because there is no explicit statement of the Examiner’s rationale in the Office Action) that the Examiner’s rationale is that there is some teaching,

suggestion, or motivation that would have led one of ordinary skill to combine the cited references' teachings to arrive at the claimed invention, MPEP §2143 (G) and the applicable case law require the following:

To reject a claim based on this rationale, Office personnel must resolve the *Graham* factual inquiries. Then, Office personnel must articulate the following:

- (1) a finding that there was some teaching, suggestion, or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings;
- (2) a finding that there was reasonable expectation of success; and
- (3) whatever additional findings based on the *Graham* factual inquiries may be necessary, in view of the facts of the case under consideration, to explain a conclusion of obviousness.

... If any of these findings cannot be made, then this rationale cannot be used to support a conclusion that the claim would have been obvious to one of ordinary skill in the art. (emphasis added).

If the Applicants' assumption of the Examiner's rationale as described above is correct, then Applicants are entitled to have the foregoing required items articulated. If the Examiner's rejection is based on some other rationale, Applicants are entitled to know what that rationale is and to be given an opportunity to respond. If an explanation of the Examiner's rationale is presented in the next Office Action, the next Office Action should not be made final.

In view of the foregoing, Applicants respectfully submit that the Examiner has merely provided a conclusory statement in support of the obviousness rejection and failed to clearly articulate a rational to support his conclusion, as required by the MPEP and *KSR*. Because "rejections based on obviousness cannot be sustained by mere conclusory statements," Applicants respectfully assert that the Examiner has failed to provide *prima facie* support for the obviousness rejection with respect to claim 7. As a result, Applicants respectfully assert that a *prima facie* case of obviousness rejection have not been established with respect to claim 7.

Independent Claim 8

Applicants respectfully assert that a *prima facie* case of obviousness rejection have not been established with respect to claim 8. Specifically, Applicants respectfully assert that Wang in view of Xiang does not teach all of the limitations of claim 8. In

addition, Applicants respectfully assert that the Examiner has failed to provide *prima facie* support for the obviousness rejection with respect to claim 8.

Wang in view of Xiang does not teach all of the limitations of claim 8.

The Office Action on page 6 suggests that Wang teaches all of the limitations of claim 8 except the limitation of “*said first area having a thickness of 2-6 nm.*” Xiang is cited for teaching the above-identified limitation of claim 8. The Office Action then concludes that “[i]t would have been obvious to a person of ordinary skill in the art at the time of the invention was made, to make the first area have a thickness of 2-6 nm, as taught by Xiang, and therefore make the second area have a thickness of 6-12 nm, for the purpose of speeding recrystallization and amorphization.” (See page 6 of the Office Action).

However, Applicants respectfully assert that Wang does not teach the limitation of “*the second area having a thickness of 6-12 nm,*” as recited in claim 8. As described above with respect to the rejection of claim 1, Wang teaches that the doped source/drain region (218) is formed in the substrate (200) on each side of the spacer (214). Wang also teaches that a doped source/drain extension region (212) is formed in the substrate (200) on each side of a spacer (205). (See step S108 in Fig. 1, Fig. 2C and step S308 in Fig. 3 and paragraphs [0027], [0031], [0037], and [0040] of Wang).

The Office Action suggests that the doped source/drain region (212) of Wang is equivalent to the “*first area having a first conductivity profile*” recited in claim 8. The Office Action also suggests that the doped source/drain region (218) of Wang is equivalent to the “*second area having a second conductivity profile*” of claim 8. The Office Action also states that “the second area having a thickness that is 2 to 4 times the thickness of the first area.” (See page 6 of the Office Action).

However, Wang does not teach that the doped source/drain region (218) has a thickness that is 2 to 4 times the thickness of the doped source/drain region (212). In particular, Wang is silent as to the thickness of the doped source/drain region (218) as well as the thickness of the doped source/drain region (212). Because Wang is silent as to the thickness of the doped source/drain region (218) as well as the thickness of the doped source/drain region (212), Wang does not teach that the doped source/drain region

(218) has a thickness that is 2 to 4 times the thickness of the doped source/drain region (212). Thus, Wang does not teach “the second area having a thickness that is 2 to 4 times the thickness of the first area,” as suggested in the Office Action.

As a result, even if Xiang teaches the limitation of “*said first area having a thickness of 2-6 nm*,” as recited in claim 8, Wang still does not teach the limitation of “*the second area having a thickness of 6-12 nm*,” as recited in claim 8. Because Wang in view of Xiang does not teach all of the limitations of claim 8, Applicants respectfully assert that claim 8 is patentable over Wang in view of Xiang.

The Examiner has failed to provide *prima facie* support for the obviousness rejection with respect to claim 8.

In addition, Applicants respectfully assert that the Examiner has failed to provide *prima facie* support for the obviousness rejection with respect to claim 8.

The only statement made by the Examiner in support of an obviousness rejection of claim 8 is that “[i]t would have been obvious to a person of ordinary skill in the art at the time of the invention was made, to make the first area have a thickness of 2-6 nm, as taught by Xiang, and therefore make the second area have a thickness of 6-12 nm, for the purpose of speeding recrystallization and amorphization,” which is a mere conclusory statement and fails to clearly articulate a rationale in support of the obviousness rejection, as required by the MPEP and *KSR*. The Examiner’s identification of the teachings of Wang and Xiang, along with the conclusory statement of “[i]t would have been obvious to a person of ordinary skill in the art at the time of the invention was made, to make the first area have a thickness of 2-6 nm, as taught by Xiang, and therefore make the second area have a thickness of 6-12 nm, for the purpose of speeding recrystallization and amorphization” without any rationale in support of that conclusion, does not satisfy the requirements for establishing a *prima facie* case of obviousness.

Assuming (because there is no explicit statement of the Examiner’s rationale in the Office Action) that the Examiner’s rationale is that there is some teaching, suggestion, or motivation that would have led one of ordinary skill to combine the cited references’ teachings to arrive at the claimed invention, MPEP §2143 (G) and the applicable case law require the following:

To reject a claim based on this rationale, Office personnel must resolve the *Graham* factual inquiries. Then, Office personnel must articulate the following:

- (1) a finding that there was some teaching, suggestion, or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings;
- (2) a finding that there was reasonable expectation of success; and
- (3) whatever additional findings based on the *Graham* factual inquiries may be necessary, in view of the facts of the case under consideration, to explain a conclusion of obviousness.

... If any of these findings cannot be made, then this rationale cannot be used to support a conclusion that the claim would have been obvious to one of ordinary skill in the art. (emphasis added).

If the Applicants' assumption of the Examiner's rationale as described above is correct, then Applicants are entitled to have the foregoing required items articulated. If the Examiner's rejection is based on some other rationale, Applicants are entitled to know what that rationale is and to be given an opportunity to respond. If an explanation of the Examiner's rationale is presented in the next Office Action, the next Office Action should not be made final.

In view of the foregoing, Applicants respectfully submit that the Examiner has merely provided a conclusory statement in support of the obviousness rejection and failed to clearly articulate a rational to support his conclusion, as required by the MPEP and *KSR*. Because "rejections based on obviousness cannot be sustained by mere conclusory statements," Applicants respectfully assert that the Examiner has failed to provide *prima facie* support for the obviousness rejection with respect to claim 8.

Thus, Applicants respectfully assert that Wang in view of Xiang does not teach all of the limitations of claim 8. In addition, Applicants respectfully assert that the Examiner has failed to provide *prima facie* support for the obviousness rejection with respect to claim 8. As a result, Applicants respectfully assert that a *prima facie* case of obviousness rejection have not been established with respect to claim 8.

Dependent Claims 9 and 10

Claims 9 and 10 ultimately depend from and incorporate all of the limitations of independent claim 8. Thus, Applicants respectfully assert that claims 9 and 10 are allowable at least based on an allowable claim 8.

CONCLUSION

Applicants respectfully request reconsideration of the claims in view of the remarks made herein. A notice of allowance is earnestly solicited.

Respectfully submitted on behalf of:

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Date: September 10, 2010

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